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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/608,843 | 06/27/2003 | Taekeun Lee | CPAC 1014-4 | 7642 |
| 22470 | 7590 | 02/23/2005 | EXAMINER | |
| HAYNES BEFFEL & WOLFELD LLP P O BOX 366 HALF MOON BAY, CA 94019 | | | NGUYEN, KHIEM D | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2823 | |

DATE MAILED: 02/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/608,843

Applicant(s)

LEE ET AL.

Examiner

Khiem D. Nguyen

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 December 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 June 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date: _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date: _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

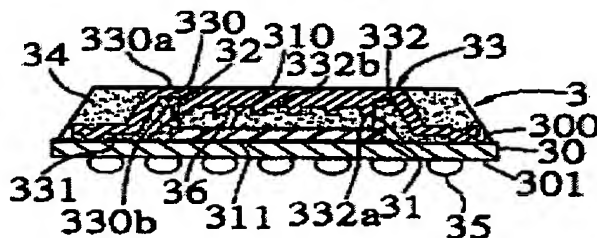
A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

1. Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by Huang et al. (U.S. Patent 6,400,014).

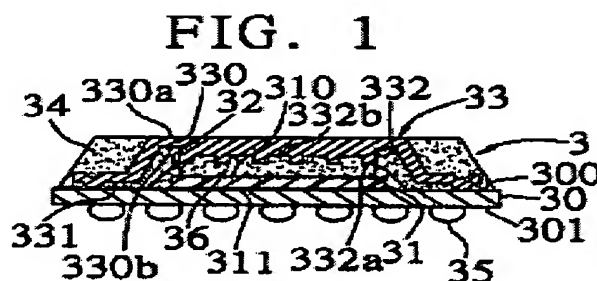
In re claim 1, **Huang** discloses a method for manufacturing a plastic ball grid array package, comprising placing a heat spreader **33** having an upper portion **330a** and a plurality of support arms **331** into a mold cavity, placing over the mold cavity a ball grid array including a semiconductor die **31** mounted on a support surface of a substrate **30** and connected to the substrate, such that lower ends of the support arms contact the support surface **300** of the substrate peripheral to the die; injecting molding material **34** into the cavity; and permitting the molding material to harden to form a mold cap (col. 3, line 53 to col. 4, line 40 and FIGS. 1-7).

FIG. 1



2. Claim 10 is rejected under 35 U.S.C. 102(e) as being anticipated by Huang et al. (U.S. Patent 6,400,014).

In re claim 10, **Huang** discloses a method for manufacturing a plastic ball grid array package, comprising placing a heat spreader **33** having an upper portion **330a** and a plurality of support arms **331** onto the die support surface **300** of the substrate **30** such that at least one of the supporting arms of the heat spreader is affixed to the substrate using a resilient fixative such as an elastomeric adhesive; placing a mold cavity over the heat spreader; injecting the molding material **34** into the cavity; and permitting the molding material to harden to form a mold cap (col. 3, line 53 to col. 4, line 40 and FIGS. 1-7).



Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 2-9 and 11-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang et al. (U.S. Patent 6,400,014) in view of Brestel (U.S. Patent 5,328,811).

In re claims 2, 3, 6, 11, 12, and 15, Huang discloses wherein the heat spreader 33 is made of metal (col. 4, lines 13 to 40 and FIG. 1) but does not explicitly disclose treating an undersurface of the metal heat spreader to form a black copper oxide layer prior to injecting the molding material.

Brestel discloses treating an undersurface of the copper layer 3 with a base solution of NaClO_2 to form a black copper oxide layer. It would have been obvious to one of ordinary skill in the art of making semiconductor devices to combine the teaching of Huang and Brestel to enable the black copper oxide layer of Huang to be formed and furthermore a blackened copper oxide layer exhibits high absorption of infrared radiation (col. 5, lines 3-18 and FIGS. 1-7).

In re claims 4 and 13, Brestel discloses wherein the black copper oxide layer having a thickness in the range 10 μm up to some tens of μm (col. 5, lines 16-18).

In re claims 5, 8, 9, 14, 17, and 18, neither Huang nor Brestel disclose a black copper oxide layer having a thickness of 7 μm and wherein the treating comprises micro-etching the copper undersurface of the heat spreader to a roughness in the range 0.5 μm to 1.0 μm . However, there is no evidence indicating the thickness and the roughness range of the black copper oxide layer is critical and it has been held that it is not inventive to discover the optimum or workable thickness of a result-effective variable within given prior art conditions by routine experimentation. See MPEP § 2144.05. Note that the specification contains no disclosure of either the critical nature of the claimed dimensions of any unexpected results arising there from. Where patentability is aid to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant

must show that the chosen dimensions are critical. In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

In re claims 7 and 16, **Brestel** discloses wherein the treating comprises micro-etching the copper undersurface of the copper layer (col. 5, lines 3-45 and FIGS. 1-7).

Response to Applicants' Amendment and Arguments

Applicant's arguments filed December 10th, 2004 have been fully considered but they are not persuasive.

Applicants contend that the reference Huang et al. (U.S. Patent 6,400,014) herein known as Huang, says nothing about placing the heat sink into a mold cavity and then (in a subsequent step) placing the ball grid array over the cavity, as recited in the claim.

In response to Applicants' argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., "...and then (in a subsequent step)...") are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

In response to Applicants' contention that Huang says nothing as to at least one supporting arm of the heat spreader being affixed to the substrate using a resilient fixative, as recited in the claim, Examiner respectfully disagrees. Applicants are directed to (col. 3, line 53 to col. 4, line 9 and FIG. 1) where Huang discloses that the heat spreader 33 being affixed to the substrate 30 using a resilient fixative.

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In response to Applicants' contention that the Brestel reference (U.S. Patent 5,328,811) is an unrelated art, Examiner respectfully disagrees. The Brestel reference is only being used as a secondary reference to teach treating the undersurface of a copper layer to form a black copper oxide layer. As disclose in col. 5, lines 2-18, Brestel teaches treating the undersurface of a copper layer comprises reacted the copper undersurface with a base solution of NaClO_2 to form a black copper oxide layer.

For these reasons, examiner holds the rejection proper.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khiem D. Nguyen whose telephone number is (571) 272-1865. The examiner can normally be reached on Monday-Friday (8:00 AM - 5:00 PM).

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on (571) 272-1855. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

K.N.
February 21st, 2005



**W. DAVID COLEMAN
PRIMARY EXAMINER**